

REMARKS/ARGUMENTS

Claims 1 through 20 stand rejected. Applicant has amended claims 1 through 20, though not for statutory purposes. The claims were modified to correct errors in grammar and idiomatic English, and to make explicit what had been implicit in the claims as previously written. The claims as amended are not narrower in scope – in some instances, their scope is now broader.

Applicant has attached an exhibit, captioned “Version with markings to show changes made,” that shows the changes that were made to the claims.

Applicant would like to draw the Examiner’s attention to Office Action Summary, item 13, wherein it states that some certified copies of the priority documents have been received. However, in a communication from the PTO dated August 17, 2001, all required items are designated as received. Applicant respectfully requests clarification of which documents, if any, were not received.

I. Rejections Under 35 U.S.C. § 102

The Office Action rejects claims 1-5 and 10-14 under 35 U.S.C. 102(e), asserting that U.S. Patent No. 6,293,643 (“Shimada”) anticipates the claims. Applicant respectfully disagrees and traverses this rejection.

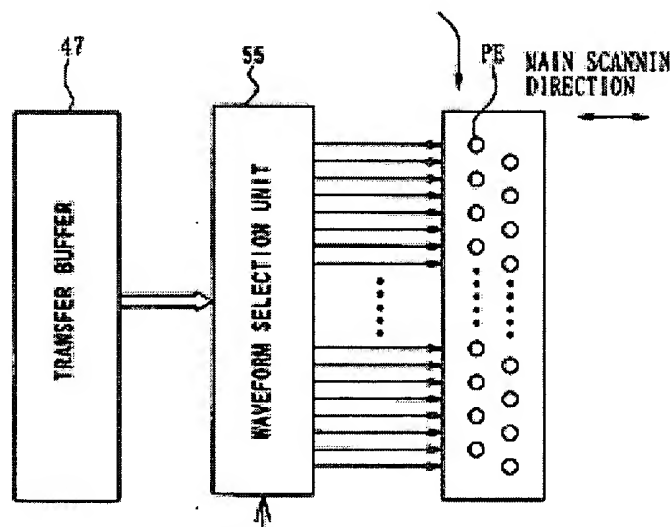
To anticipate a claim under 35 U.S.C. § 102, the cited reference must disclose every element of the claim, as arranged in the claim, and in sufficient detail to

enable one skilled in the art to make and use the anticipated subject matter. See PPG Industries, Inc. v. Guardian Industries Corp., 75 F.3d 1558, 1566 (Fed. Cir. 1996); C.R. Bard, Inc. v. M3 Sys., Inc., 157 F.3d 1340, 1349 (Fed. Cir. 1998). A reference that does not expressly disclose all of the elements of a claimed invention cannot anticipate unless all of the undisclosed elements are inherently present in the reference. See Continental Can Co. U.S.A. v. Monsanto Co., 942 F.2d 1264, 1268 (Fed. Cir. 1991).

Claim 1 is an independent claim. Among the limitations of claim 1 that are neither disclosed nor suggested by Shimada are:

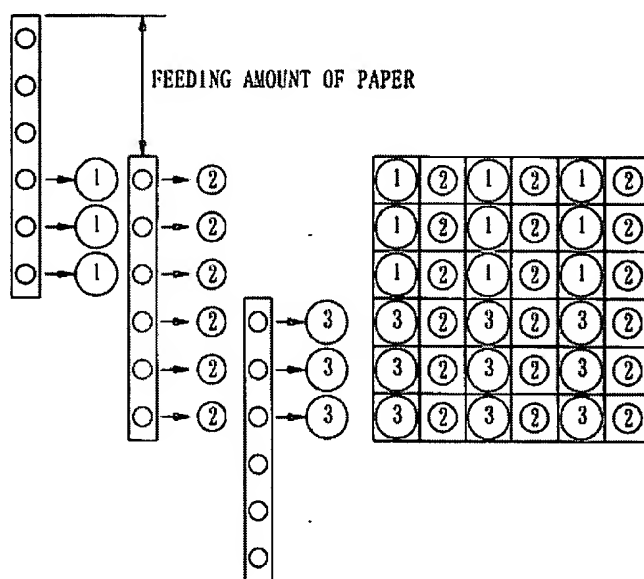
- scanning said ink jet recording head in a first direction while simultaneously generating a plurality of drive waveform signals;
- selecting for each of said plurality of nozzles any one or none of said plurality of drive waveform signals; and
- applying said selected drive waveform signals to respective piezoelectric actuators corresponding to said plurality of nozzles.

The Office Action refers to Figure 9, reproduced below, of Shimada as disclosing waveform selection unit 55 selecting one of said plurality of waveforms (i.e., W1, W2) corresponding



to inkdrops 1 or 2. Shimada produces only one drive waveform signal at a time and waveform selection unit 55 can only select that one drive waveform signal to the plurality of nozzles as evidenced by Figures 15 and 19. Shimada does not disclose the simultaneous generation of a plurality of drive waveform signals as expressly required by independent claim 1.

As shown in Figure 15, reproduced below, Shimada does not simultaneously generate a plurality of drive waveform signals while scanning the recording head. Only one drive waveform signal is generated and applied to the plurality of nozzles while the recording head is scanned.



As shown in the preceding example, three passes are required to print the 6x6 matrix; ink droplet 3 during the first pass, ink droplet 2 during the second pass, and ink droplet 1 during the third pass. (Col. 13, lns. 21—34). There is no indication of a plurality of drive waveform signals being simultaneously generated, selecting a drive waveform signal for each nozzle, and applying one of the selected of drive waveform signals to each nozzle as explicitly required by claim 1.

Claim 1 is neither disclosed nor suggested in the art of record. Therefore, it is asserted that independent claim 1 is patentable over Shimada. Additionally, claims 2-9 include the limitations of claim 1 and include additional limitations, which in combination with the limitations of claim 1, are also neither disclosed or suggested in the prior art of record. It is asserted that these claims are patentable as well. Reconsideration of the rejection under 35 U.S.C. § 102(e) is respectfully requested.

Claim 10 is an independent claim. Among the limitations of claim 10 that are neither disclosed nor suggested by Shimada are:

waveform generating means for simultaneously generating a plurality of drive waveform signals based on said drive waveform information that is read from said recording means;

control means move for moving said ink jet recording head and selecting any one or none of the plurality of drive waveform signals for each of said plurality of nozzles; and

drive means for applying said drive waveform signal to said piezoelectric actuators by selecting none or one of a plurality of drive waveform signals output from said drive generating means.

The Office Action refers to Figure 9 of Shimada as disclosing waveform selection unit 55 selecting one of said plurality of waveforms (i.e., W1, W2) corresponding to inkdrops 1 or 2. Shimada produces only one drive waveform signal and applies that one drive waveform to the plurality of nozzles as evidenced by Figures 15 and 19. Shimada does not disclose an apparatus capable of the simultaneous generation of a plurality of drive waveform signals then selecting one of the plurality of drive waveform signals for each nozzle, and applying each of the selected of drive waveform signals to a nozzle as explicitly required by claim 10.

As shown in Figure 15 above, the apparatus of Shimada does not simultaneously generate a plurality of drive waveform signals while scanning the recording head. Only one drive waveform signal is generated while the recording head is scanned and that one drive waveform signal is applied to the plurality of nozzles. As shown in the preceding example, three passes are required to print the 6x6 matrix; ink droplet 3 during

the first pass, ink droplet 2 during the second pass, and ink droplet 1 during the third pass. There is no indication that the apparatus is capable of simultaneously generating a plurality of drive waveform signals, selecting for each of a plurality of nozzles a corresponding drive waveform signal selected from the plurality of drive waveform signals, and applying the selected of drive waveform signals to each nozzle as explicitly required by claim 10.

Claim 10 is neither disclosed nor suggested in the art of record. Therefore, it is asserted that independent claim 10 is patentable over Shimada. Additionally, claims 11-20 include the limitations of claim 10 and include additional limitations, which in combination with the limitations of claim 10, are also neither disclosed or suggested in the prior art of record. It is asserted that these claims are patentable as well. Reconsideration of the rejection under 35 U.S.C. § 102(e) is respectfully requested.

Claims 2 through 9 depend from and contain all the limitations of independent claim 1, and claims 11 through 20 depend from and contain all the limitations of independent claim 10. These dependent claims also recite additional limitations which, in combination with the limitations of their respective independent base claims, are neither disclosed nor suggested by the cited reference and are further believed to be directed towards patentable subject matter.

Consequently, we request that the Examiner withdraw his rejection under 35 U.S.C. § 102(e) of these dependent claims.

II. Rejections Under 35 U.S.C. § 112

The Examiner has rejected claims 6 - 9 and 15 - 20 under 35 U.S.C. §112, second paragraph, asserting that these claims are indefinite for failing to point out and distinctly claim the subject matter which applicant regards as the invention due to the phrase "opposed to one."

In accordance with the Examiner's remarks, and to more clearly define the invention, Applicant has amended claims 6-9 and 15-20. Consequently, Applicant requests that the Examiner withdraw the rejection under 35 U.S.C. § 112.

IV. Conclusion

In view of the above, we respectfully submit that each of the presently pending claims in this application is in immediate condition for allowance. Accordingly, we request that the Examiner withdraw his outstanding rejection of the pending claims and pass this application to issue.

Dated: July 10, 2002

Respectfully submitted,

By 

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APPENDIX A
Version With Markings To Show Changes Made
37 C.F.R. § 1.121(b)(1)(iii) AND (c)(1)(ii)

CLAIMS:

1. (Amended) An ink jet recording head driving method [provided with] the ink jet recording head having a plurality of nozzles and a plurality of pressure generating chambers and piezoelectric actuators corresponding thereto [by applying drive waveform signals to piezoelectric actuators provided at the positions corresponding to the pressure generating chambers in case of recording and rapidly changing the volume of pressure generating chambers filled with ink; thereby discharging ink droplets from said plurality of nozzles and forming dots on a recording medium], said process comprising [the steps of]:

scanning said ink jet recording head in a first direction [which is relatively orthogonal to the located direction] while simultaneously generating a plurality of drive waveform signals [according to a jet amount of said ink droplets];

selecting [any one or none of said plurality of waveform signals] for each of said plurality of nozzles [concerning] any one or none of said plurality of drive waveform signals [according to gray scale information of printing data]; and

applying said selected drive waveform signals [voltage] to respective [corresponding] piezoelectric actuators corresponding to said plurality of nozzles. [, while said ink jet recording head is moved in a second direction which is relatively orthogonal to said first direction concerning said recordable medium.]

2. (Amended) The ink jet recording head driving method [comprising a plurality] according to claim 1, characterized in that at least one of [a] said plurality of drive waveform signals [generated at said dot forming process] is different from [any of] a [plurality of] drive waveform [signals] signal generated [at the] during a previously executed dot forming process.

3. (Amended) The ink jet recording head driving method [comprising a plurality] according to claim 1, characterized in that [a dot forming process,] drive waveform signals for discharging ink droplets with a large jet amount of ink and [those] drive waveform signals for

discharging ink droplets with a small jet amount of ink and are generated [in combination] simultaneously.

4. (Amended) The ink jet recording head driving method [comprising a plurality] according to claim 1, characterized in that [at said dot forming process,] drive waveform signals for discharging ink droplets with a large jet amount [and those] of ink and drive waveform signals for discharging ink droplets with a small jet amount of ink are alternately generated [executed].

5. (Amended) The ink jet recording head driving method [comprising a plurality] according to claim 1, characterized in that [said] a dot forming process is executed at least twice on [one and the] a same place of said recording medium.

6. (Amended) The ink jet recording head driving method [comprising a plurality] according to claim 5, characterized in that [at] during said dot forming process, nozzles [which] that are positioned at [the] a different place from the nozzles used [at the] during a previously executed dot forming process pass the place [opposed to one and] opposite the same place of said recording medium.

7. (Amended) The ink jet recording head driving method [comprising a plurality] according to claim 5, characterized in that at the [aforementioned] dot forming process, nozzles which are positioned [at] during the same place as the nozzles used [at] during the previously executed dot forming process pass the place [opposed to one and] opposite the same place of said recording medium.

8. (Amended) The ink jet recording head driving method [comprising a plurality] according to claim 6, characterized in that the combination of drive waveform signals [selected at once of the dot forming process] is determined on the basis of [not only the] a number of times of said dot forming process is performed [but also] and the number of times [whereof] the same or a different [nozzles pass] a nozzle passes the place [opposed to one and] opposite the same place of said recording medium.

9. (Amended) The ink jet recording head driving method [comprising a plurality] according to claim 8, characterized in that the number of times [of the aforementioned dot forming process but also the number of times whereof the same or different nozzles pass the place opposed to one and the same place of said recording medium are determined] the dot forming process is performed is determined based on [the basis of] a high-speed printing mode [which] that is [set up] for printing in a high-speed and a high-quality image mode [which is set up for printing in high-quality image].

10. (Amended) An ink jet recording head driving circuit [provided with] the ink jet recording head having a plurality of nozzles and a plurality of pressure generating chambers and piezoelectric actuators corresponding thereto [applying drive waveform signals to piezoelectric actuators provided at the positions corresponding to the pressure generating chambers in case of recording and rapidly changing the volume of pressure generating chambers filled with ink; thereby discharging ink droplets from said plurality of nozzles; and forming dots on a recording medium], said ink jet recording head driving circuit [characterized in] comprising:

[a] recording means [which records] for recording drive waveform information [on] for drive waveform signals [at each jet amount of said ink droplets];

[a] waveform generating means [which generates] for simultaneously generating a plurality of drive waveform signals [on the basis of information on a plurality of drive waveforms, which are] based on said drive waveform information read [out] from said recording means;

[a] control means [which moves] for moving said ink jet recording head [in a first direction which is relatively orthogonal to the located direction of said plurality of nozzles concerning said recording medium] and [outputs waveform] selecting [signals indicating that, on the basis of gray scale information of printing data], for each of said plurality of nozzles, any one or none of the plurality of drive waveform signals [for each of said plurality of nozzles]; and

[a] drive means [which applies voltage] for applying said drive waveform signal to said piezoelectric actuators by selecting none or [any] one of a plurality of drive waveform signals output [outputted] from said [plurality of] drive generating means [on the basis of said waveform selecting data, characterized in repeating not only scanning of said ink jet recording head in the first direction but also outputting said waveform selecting data, while said control

means moves said ink jet recording head in a second direction which is relatively orthogonal to said first direction concerning said recording medium].

11. (Amended) An ink jet recording head driving circuit according to claim 10, characterized in that said waveform generating means generates at least one drive waveform signal [which] that is different from any of a plurality of drive waveform signals generated at [the] during a previous scanning [at every] of said ink jet recording head in [a] said first direction.

12. (Amended) An ink jet recording head driving circuit according to claim 10, characterized in that said waveform generating means simultaneously generates drive waveform signals for discharging ink droplets with a large [jet amount and those] amount of ink and drive waveforms for discharging ink droplets with a small [jet] amount of ink [in combination].

13. (Amended) An ink jet recording head driving circuit according to claim 10, characterized in that said waveform generating means alternately generates a plurality of drive waveform signals for discharging ink droplets with a relatively large [jet amount and those with] amount of ink and drive waveform signals for discharging a relatively small [jet] amount of ink at every scanning of said ink jet recording head in [a] said first direction.

14. (Amended) An ink jet recording head driving circuit according to claim 10, characterized in that said control means [executes at least twice of not only scanning in the first direction of said ink jet recording head but outputting said waveform selecting data on one and the] selects said drive waveforms signals for execution at least two times in a same place of said recording medium.

15. (Amended) The ink jet recording head driving circuit according to claim 14, characterized in that said control means makes nozzles, which are positioned at [the] a different place from the nozzles used [for] during the scanning of the ink jet recording head in the first direction, pass the place [opposed to one and] opposite the first place of said recording medium.

16. (Amended) The ink jet recording head driving circuit according to claim 14, characterized in that said control means makes nozzles, which are positioned at the same place as

the nozzles used for scanning of said ink jet recording head in the first direction, pass the place [opposed to one and] opposite the same place of said recording medium.

17. (Amended) The ink jet recording head driving circuit according to claim 15, characterized in that said control means [generates] selects said drive waveform [selecting data] signals on the basis of [the data,] supplied [from outside, concerning combination of drive waveform signals selected at not only once of scanning of said ink jet recording head in the first direction but also outputting the waveform selecting] data.

18. (Amended) The ink jet recording head driving circuit according to claim 17, characterized in that a combination of [said] drive waveform signals is determined on the basis of [not only the] a number of times [of scanning of] said ink jet recording head [in the first direction but also the] scans and a number of times [whereof the] a same or different nozzle [nozzles pass the] passes a place [opposed to one and] opposite the same place of said recording medium.

19. (Amended) The ink jet recording head driving circuit according to claim 18, characterized in that the number of times [of scanning of] said ink jet recording head [in the first direction but also] scans and the number of times whereof the same or different [nozzles pass] nozzle passes the place [opposed to one] opposite and the same place of said recording medium [are] is determined on the basis of a high-speed printing mode [which is set up] for printing [in] a high-speed and a [high-quality image mode which is set up for printing in] high-quality image.

20. (Amended) The ink jet recording head driving circuit according to claim 15, characterized in that said control means determines a number of times [of scanning of] said ink jet recording head scans in the first direction [but also] and a number of times [whereof the] same or a different [nozzles pass] nozzle passes the place [opposed to one and] opposite the same place of said recording medium on the basis of a high-speed printing mode [which is set up for printing in high-speed and a high-quality image mode which is set up for printing in high-quality image, determines the], determines a combination of drive waveform signals selected [at not only once of scanning of said ink jet recording head in the first direction but also outputting said waveform selecting data on the basis of the determined number of times of scanning of said ink

jet recording head in the first direction and number of times whereof the same or different nozzles pass the place opposed to one and the same place of said recording medium,] and generates said waveform selecting data on the basis of the determined combination of said drive waveform signals.